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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/821,415	03/28/2001	Yehiel Gotkis	LAM2P246	3672

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EXAMINER

VU, HUNG K

ART UNIT PAPER NUMBER

2811

DATE MAILED: 04/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/821,415

Applicant(s)

GOTKIS ET AL.

Examiner

Hung K. Vu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 March 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 9-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Invention of Group I, Claims 1-8, in Paper No. 3 is acknowledged.

2. Claims 9-20 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Invention, there being no allowable generic or linking claim.

Election was made **without** traverse in Paper No. 3.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the plurality of supporting stubs, as recited in claim 6, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 1-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Bothra et al. (PN 5,798,559). Note Figures 4 and 5 of Bothra et al..

Bothra et al. discloses a semiconductor device comprising,

A substrate (100) having transistor devices (active devices, MOS devices);

A plurality of copper interconnect metallization lines (118,138,154) and conductive vias defined in each of a plurality of interconnect levels of the semiconductor device, the plurality of copper interconnect metallization lines and conductive vias isolated from each other by an air dielectric (180);

A plurality of supporting stubs (126,146), each of the plurality of supporting stubs configured to form a supporting column that extends through the plurality of interconnect levels of the semiconductor device.

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With regard to claim 2, Bothra et al. discloses the plurality of copper interconnect metallization lines and conductive vias define dual damascene structures (114&118, 110&118, 134&138, 155&154).

With regard to claim 3, Bothra et al. discloses the plurality of supporting stubs are not electrically interconnected to the plurality of copper interconnect metallization lines and conductive vias.

With regard to claim 4, Bothra et al. discloses the device further comprising a passivation layer (158) defined over a topmost layer of the copper interconnect metallization lines and conductive vias.

With regard to claim 5, Bothra et al. discloses the plurality of supporting stubs further support the passivation layer.

6. Claims 1-5 are rejected under 35 U.S.C. 102(e) as being anticipated by Buynoski (PN 6,078,008). Note Figures 1-4 of Buynoski

Buynoski discloses a semiconductor device comprising,

A substrate having transistor devices (active regions,source/drain);

A plurality of copper interconnect metallization lines (metal1-metal6 on right hand side) and conductive vias (via1-via5 on right hand side) defined in each of a plurality of interconnect

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levels of the semiconductor device, the plurality of copper interconnect metallization lines and conductive vias isolated from each other by an air dielectric (20);

A plurality of supporting stubs (metal1-metal6 and via1-via5 on left hand side), each of the plurality of supporting stubs configured to form a supporting column that extends through the plurality of interconnect levels of the semiconductor device.

With regard to claim 2, Buynoski discloses the plurality of copper interconnect metallization lines and conductive vias define dual damascene structures.

With regard to claim 3, Buynoski discloses the plurality of supporting stubs are not electrically interconnected to the plurality of copper interconnect metallization lines and conductive vias.

With regard to claim 4, Buynoski discloses the device further comprising a passivation layer (40) defined over a topmost layer of the copper interconnect metallization lines and conductive vias.

With regard to claim 5, Buynoski discloses the plurality of supporting stubs further support the passivation layer.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bothra et al. (PN 5,798,559) in view of Ahn et al. (PN 6,277,728).

Bothra et al. discloses the plurality of copper interconnect metallization lines and conductive vias isolated from each other by air dielectric. Bothra et al. discloses all of the claimed limitations except the plurality of copper interconnect metallization lines and conductive vias isolated from each other by a porous dielectric material. However, Ahn et al. discloses the plurality of copper interconnect metallization lines and conductive vias (48,54,70) isolated from each other by air dielectric, a porous dielectric material, or low dielectric material (56). Note Figures 1-12 and Table of Ahn et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the plurality of copper interconnect metallization lines and conductive vias of Bothra et al. isolated from each other by a porous dielectric material, such as taught by Ahn et al. because air dielectric and a porous dielectric material are commonly used and interchangeable as the interlayer low dielectric material, and further the porous dielectric material would provide better mechanical support for the device.

8. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buynoski (PN 6,078,088) in view of Ahn et al. (PN 6,277,728).

Buynoski discloses the plurality of copper interconnect metallization lines and conductive vias isolated from each other by air dielectric. Buynoski discloses all of the claimed limitations except the plurality of copper interconnect metallization lines and conductive vias isolated from each other by a porous dielectric material. However, Ahn et al. discloses the plurality of copper

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interconnect metallization lines and conductive vias (48,54,70) isolated from each other by air dielectric, a porous dielectric material, or low dielectric material (56). Note Figures 1-12 and Table of Ahn et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the plurality of copper interconnect metallization lines and conductive vias of Buynoski isolated from each other by a porous dielectric material, such as taught by Ahn et al. because air dielectric and a porous dielectric material are commonly used and interchangeable as the interlayer low dielectric material, and further the porous dielectric material would provide better mechanical support for the device.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (703) 308-4079. The examiner can normally be reached on Mon-Thurs 7:00-5:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

April 19, 2002

Steven Locke
Primary Examiner

